SANTA CLARA COUNTY
FLOOD CONTROL AND WATER DISTRICT
SAN JOSE, CALIFORNIA

GEOLOGIC AND HYDROLOGIC INVESTIGATION OF THE GIFFORD PROPERTY SUBDIVISION ADJACENT TO THE PENITENCIA RECHARGE CANAL

Memorandum Report
July 1972

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SANTA CLARA VALLEY WATER DISTRICT
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SAN JOSE, CALIFORNIA 95118

MEMORANDUM

TO: Mr. Lloyd C. Fowler DATE: July 12, 1972

FROM: Water Supply Division

SUBJECT: Geologic and Hydrologic Investigation of the Gifford Property Subdivision Adjacent to the Penitencia Recharge Canal

INTRODUCTION

This report presents the results of a brief geologic and hydrologic investigation at the proposed Gifford property subdivision. The Gifford property is located on Penitencia Creek Road between Capitol Avenue and White Road and is presently bisected by the Penitencia Recharge Canal. The subdivision is planned for development by the Arcadia Corporation. Ruth and Going is the principal engineering firm for the development, while the soils engineering firm is Applied Soil Mechanics, Inc.

The purpose of the investigation was to determine the amount of benefit, if any, the District would receive in exchanging the 50-foot-wide recharge canal property for an equal area with a somewhat rectangular shape. The investigation was conducted by James V. Vantine, Raj K. Narang, and Michael Gilton of the Water Supply Division.

When the original plans for the subdivision were submitted during the fall of 1971, the District required bridging of the canal before approval. In order to eliminate the expense of constructing a bridge, the engineers proposed that the District exchange the canal property for a rectangular-shaped area. The developer offered to pay for all construction costs involved in relocating the existing ponds in the recharge canal and building a single large pond. The District was receptive to this proposal, providing that the District would benefit by receiving at least an equal area in exchange and that the area would be located where the higher infiltration rates occur on the Gifford property.

A brief review of existing geologic and hydrologic data was made to help decide whether or not the proposal should be accepted. The results of the review were presented in a memorandum , dated January 10, 1972, from J. Vantine to D. Gill. At that time the available data indicated that the District could receive benefit from the proposed exchange of property. Increased infiltration rates could be obtained by locating the single pond in the more pervious area at the western edge of the property.

Later discussions between the District and the developer resulted in a revised subdivision plan showing an area for one single pond on the western edge of the property. The area is adjacent to weir 19 of the canal. The remaining portion of the canal is shown on the revised plans as part of the subdivision.

RESULTS OF THE GEOLOGIC AND HYDROLOGIC INVESTIGATION

The investigation included analysis of test boring logs, comparison of actual pond areas, conducting infiltration tests, and measuring present infiltration rates in ponds 16 to 20 in the canal.

Results of Test Borings

Nine test hole borings were made by the developer to determine foundation conditions. The District made four additional borings to aid in determining potential recharge rates at the proposed single pond area. The boring logs are shown on the attached plate.

The borings made by the developer were evenly distributed throughout the subdivision and ranged in depth from 5 to 30 feet. Most borings were about 15 feet in depth. Copies of the borings are shown on the attached plate and generally show somewhat discontinuous silt, gravel, and sand deposits. The material underlying the subdivision at shallow depths consists mostly of sandy silt with subordinate silty sand and gravel deposits. Only occasional clay and clean sand and/or gravel deposits were found to occur. The area within the proposed subdivision with the more favorable conditions for infiltration is located adjacent to ponds 19 and 20 of the recharge canal.

The four 12-inch diameter borings made for the Santa Clara County Flood Control and Water District were in the area adjacent to ponds 19 and 20 and within the area where the proposed single recharge pond would be located. Two of the holes were drilled to a depth of 40 feet, while the other two holes were drilled to a depth of 15 feet. The two shallow holes were prepared for the infiltration tests by inserting a perforated 4" PVC pipe and backfilling with gravel. All four holes showed sandy silt with occasional traces of clay from the ground surface to a depth between 9 and 14 feet. Below the sandy silt deposit a more permeable silty sand and gravel deposit were encountered.

Perched groundwater or saturated conditions were not encountered in any of the test holes even though the two deeper holes were located near the canal.

Comparison of Actual Pond Areas

Although an equal area is proposed to be exchanged, a significant difference exists between the surface area of the ponds in the recharge canal and the proposed single pond. The existing canal pond surface area was estimated to be about 0.78 acre. The estimated surface area of the proposed single pond would be about 1.3 acres. The difference in areas is an important consideration in the decision to exchange property.

Results of Borehole Infiltration Tests

The two shallow boreholes drilled for the District were used to measure infiltration rates. The tests were started on Wednesday, June 28, and ran continuously through Friday, June 30. The tests were constant head type tests. A float valve was utilized to keep a constant water level in the holes at one foot below the ground surface.

Test Hole #1 had water takes between 18 and 28 gallons per hour. The average take of Test Hole #1 was about 20 gallons per hour. Test Hole #3 had water takes between 34 and 54 gallons per hour, with an average take of about 42 gallons per hour. The tests indicate that moderate, long-term infiltration rates will occur in the proposed area.

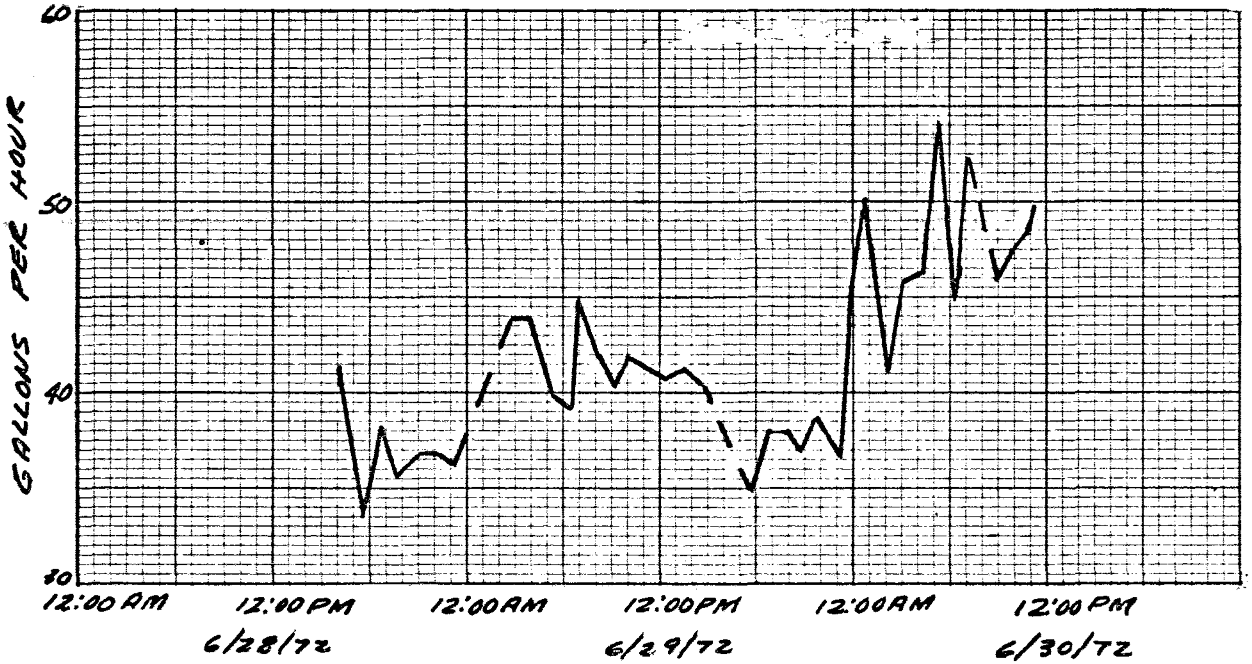
Results of the Canal Infiltration Measurements

A pump test was conducted on June 28, 1972 in order to determine more accurately the amount of infiltration in each pond of the recharge canal. The water was pumped at each weir from the upstream pond through a meter and into the downstream pond. The water level during pumping was held constant in the upstream pond. Results of the test are given below:

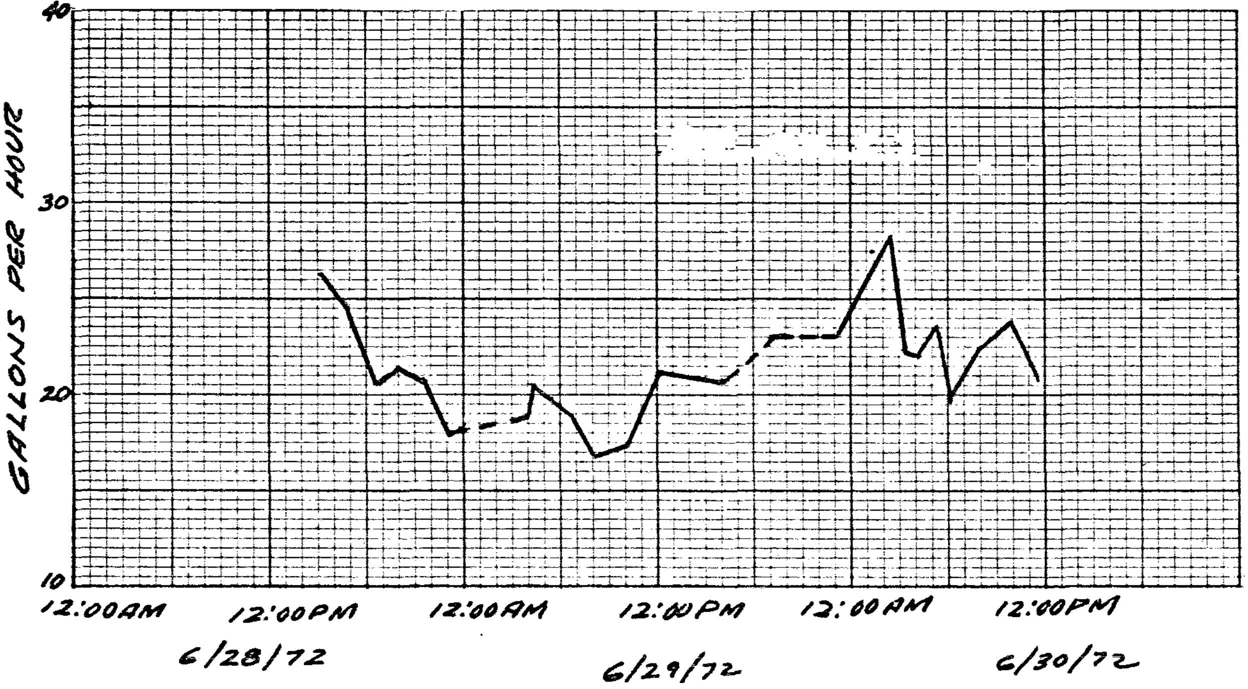
Check	Rate of Flow
Pond 20 to 21	124-125 GPM
Pond 19 to 20	204 GPM
Pond 18 to 19	230 GPM
Pond 17 to 18	247 GPM
Pond 16 to 17	285 GPM

INFILTRATION TESTS AT GIFFORD PROPERTY

TEST HOLE #3



TEST HOLE #1



Using the above figures, the average infiltration rate for each pond on the Gifford property is as follows:

Pond Number	Pond Area Sq. ft.	Pond Area Acres	Flow Rate Loss gpm	Flow Rate Loss Ac-ft/day	Infiltration Rate* ft/day
16	7,000	0.16			
17	7,800	0.18	38	0.17	0.94
18	9,400	0.22	17	0.08	0.36
19	10,200	0.23	26	0.11	0.48
20	6,900	0.16	79	0.35	2.19

*Cubic feet per square foot per day

CONCLUSIONS AND RECOMMENDATION

Conclusions

Based on the above data, it is concluded that:

1. The geologic and hydrologic conditions are more favorable for the proposed single pond than for the present recharge canal.

2. Actual pond area will be greater for the single pond than the present pond area within the recharge canal. The greater area will compensate for the loss of infiltration due to the less advantageous shape of the single pond.

3. Measured infiltration rates of the existing portion of the recharge canal within the proposed single pond area are much greater than the remaining portion of the recharge canal adjacent to the Gifford property.

Recommendation

It is recommended that the District approve the proposed exchange of property.

SANTA CLARA COUNTY FLOOD CONTROL AND WATER DISTRICT

LOGS OF TEST HOLES AT THE PROPOSED GIFFORD PROPERTY SUBDIVISION

PENITENCIA RECHARGE CANAL

REV	DESCRIPTION	SUB.	APPR.
	REFER TO TRACING FOR LATEST REVISION		

REFERENCE INFORMATION AND NOTES

1) LOCATIONS OF TEST HOLES SHOWN ABOVE ARE AT TOP OF LOG

DATE	6-29-72
DESIGN	
DRAWN	J. VANTINE
CHECKED	

ENGINEERING CERTIFICATION

PROJECT ENGINEER

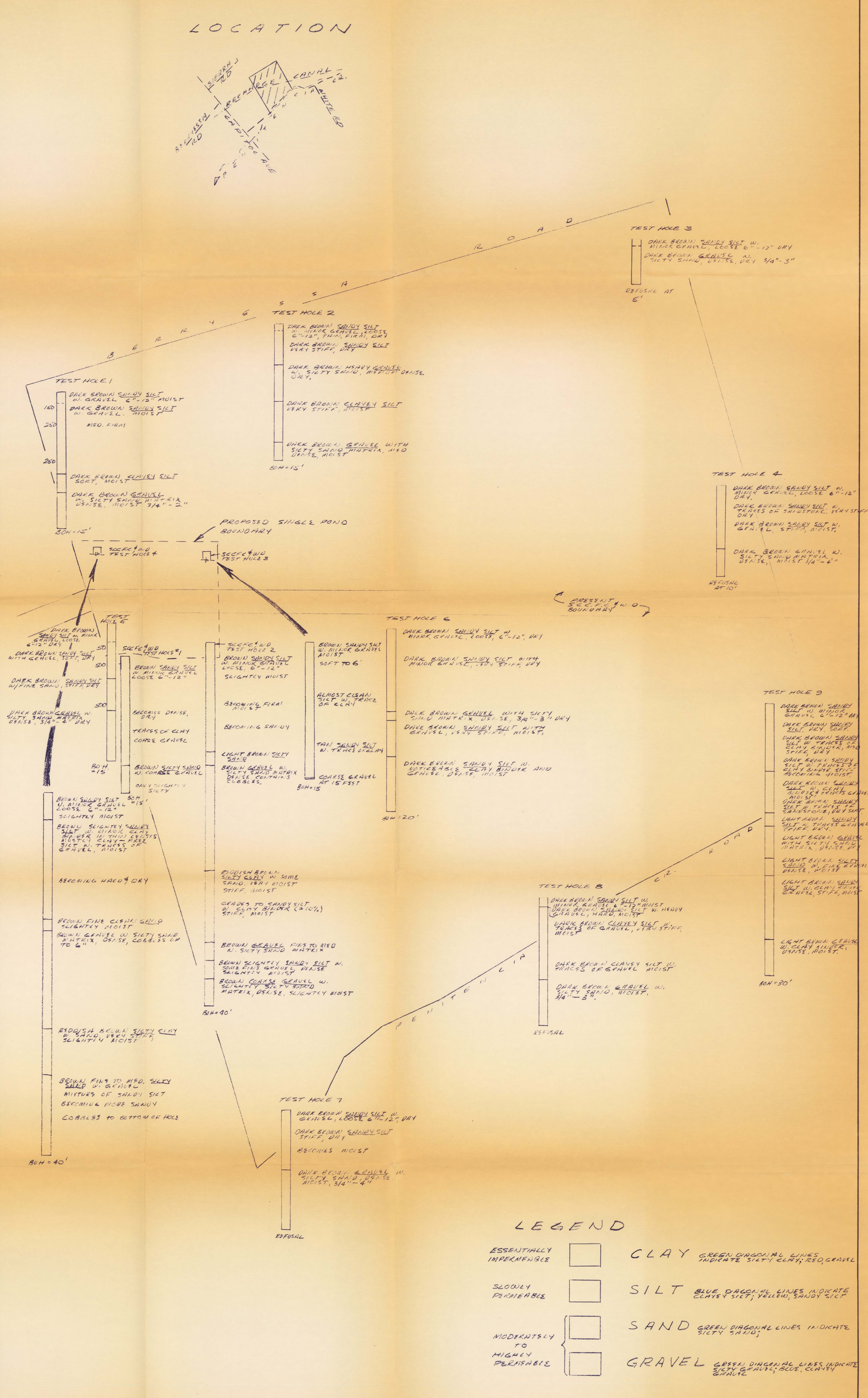
DIVISION ENGINEER R.C.E. NO. 14455

ENGINEERING APPROVAL

DEPUTY DIRECTOR OF ENGINEERING R.C.E. NO. 13462

SCALE VERT. 1"=5' HORIZ. 1"=100'

SHEET



LOCATION
SIERRA RD
BERRYESSA RD
RECHARGE CANAL
PENITENCIA CR.
WHITE RD
CAPITOL AVE
BERRYESSA ROAD
TEST HOLE 1
DARK BROWN SANDY SILT W. GRAVEL 6"-12" MOIST
150
DARK BROWN SANDY SILT W. GRAVEL. MOIST
250
MED. FIRM
250
DARK BROWN CLAYEY SILT SOFT, MOIST
DARK BROWN GRAVEL W. SILTY SAND MATRIX DENSE, MOIST 3/4"-2"
BOH=15'
TEST HOLE 2
DARK BROWN SANDY SILT W. MINOR GRAVEL, LOOSE 6"-12", THIN, FIRM, DRY
DARK BROWN SANDY SILT VERY STIFF, DRY
DARK BROWN HEAVY GRAVEL W. SILTY SAND, MEDIUM DENSE. DRY.
DARK BROWN CLAYEY SILT VERY STIFF, MOIST
DARK BROWN GRAVEL WITH SILTY SAND MATRIX, MED DENSE, MOIST
BOH=15'
TEST HOLE 3
DARK BROWN SANDY SILT W. MINOR GRAVEL, LOOSE 6"-12" DRY
DARK BROWN GRAVEL W. SILTY SAND, DENSE, DRY 3/4"-3"
REFUSAL AT 5'
TEST HOLE 4
DARK BROWN SANDY SILT W. MINOR GRAVEL, LOOSE 6"-12" DRY.
DARK BROWN SANDY SILT W. TRACES OF SANDSTONE, VERY STIFF DRY
DARK BROWN SANDY SILT W. GRAVEL, STIFF, MOIST,
DARK BROWN GRAVEL W. SILTY SAND MATRIX DENSE, MOIST 3/4"-4"
REFUSAL AT 10'
PROPOSED SINGLE POND BOUNDARY
SCCFC & WD TEST HOLE 4
SCCFC & WD TEST HOLE 3
PRESENT SCC.F.C. & W.D. BOUNDARY
TEST HOLE 5
DARK BROWN SANDY SILT W. MINOR GRAVEL, LOOSE, 6"-12" DRY
DARK BROWN SANDY SILT WITH GRAVEL, SOFT, DRY
DARK BROWN SANDY SILT W/FINE SAND, STIFF, DRY
DARK BROWN GRAVEL W. SILTY SAND MATRIX DENSE, 3/4"-4" DRY
50
500
500
B.O.H. =15'
SCCFC & WD TEST HOLE #1
BROWN SANDY SILT W. MINOR GRAVEL LOOSE 6"-12"
BECOMES DENSE, DRY
TRACES OF CLAY
COARSE GRAVEL
BROWN SILTY SAND W. COARSE GRAVEL
ONLY SLIGHTLY SILTY
BOH =15'
BROWN SANDY SILT W. MINOR GRAVEL LOOSE 6"-12"
SLIGHTLY MOIST
BROWN SLIGHTLY SANDY SILT W. MINOR CLAY BINDER IN THIN LENSES MOSTLY CLAY-FREE SILT W. TRACES OF GRAVEL, MOIST
BECOMING HARD & DRY
BROWN FINE CLEAN SAND SLIGHTLY MOIST
BROWN GRAVEL W. SILTY SAND MATRIX, DENSE, COBBLES UP TO 6"
REDDISH BROWN SILTY CLAY W. SAND, VERY STIFF SLIGHTLY MOIST
BROWN FINE TO MED. SILTY SAND W. GRAVEL
MIXTURE OF SANDY SILT
BECOMING MORE SANDY
COBBLES TO BOTTOM OF HOLE
BOH=40'
SCCFC & WD TEST HOLE 2
BROWN SANDY SILT W. MINOR GRAVEL LOOSE, 6"-12"
SLIGHTLY MOIST
BECOMING FIRM MOIST
BECOMING SANDY
LIGHT BROWN SILTY SAND
BROWN GRAVEL W. SILTY SAND MATRIX DENSE. CONTAINS COBBLES,
REDDISH BROWN SILTY CLAY W. SOME SAND, VERY MOIST
STIFF, MOIST
GRADES TO SANDY SILT W. CLAY BINDER (≥10%) STIFF, MOIST
BROWN GRAVEL FINE TO MED W. SILTY SAND MATRIX
BROWN SLIGHTLY SANDY SILT W. SOME FINE GRAVEL, DENSE SLIGHTLY MOIST
BROWN COARSE GRAVEL W. SLIGHTLY SILTY SAND MATRIX, DENSE, SLIGHTLY MOIST
BOH=40'
BROWN SANDY SILT W. MINOR GRAVEL MOIST
SOFT TO 6'
ALMOST CLEAN SILT W. TRACE OF CLAY
TAN SANDY SILT W. TRACE OF CLAY
COARSE GRAVEL AT 15 FEET
BOH=15
TEST HOLE 6
DARK BROWN SANDY SILT W MINOR GRAVEL, LOOSE, 6"-12", DRY
DARK BROWN SANDY SILT WITH MINOR GRAVEL, VERY STIFF, DRY
DARK BROWN GRAVEL WITH SILTY SAND MATRIX, DENSE, 3/4"-3" DRY
DARK BROWN SANDY SILT WITH GRAVEL, VERY STIFF, MOIST,
DARK BROWN SANDY SILT W. NOTICEABLE CLAY BINDER AND GRAVEL, DENSE, MOIST
BOH=20'
TEST HOLE 9
DARK BROWN SANDY SILT W. MINOR GRAVEL 6"-12" DRY
DARK BROWN SANDY SILT, DRY, SOFT.
DARK BROWN SANDY SILT W. TRACES OF CLAY BINDER, MED STIFF, DRY
DARK BROWN SANDY SILT W. TRACES OF CLAY BINDER, STIFF BECOMING MOIST,
DARK BROWN SANDY SILT W. CLAY BINDER & TRACES GRAVEL MOIST
DARK BROWN SANDY SILT W. TRACES OF SANDSTONE, DRY SILT,
LIGHT BROWN SANDY SILT W. TRACES GRAVEL STIFF, DRY.
LIGHT BROWN GRAVEL WITH SILTY SAND MATRIX, DENSE, DRY
LIGHT BROWN SILTY SAND W. FINE GRAVEL DENSE, MOIST
LIGHT BROWN SANDY SILT W. CLAY BINDER GRAVEL, STIFF, MOIST
LIGHT BROWN GRAVEL W. CLAY BINDER, DENSE, MOIST.
BOH=30'
WHITE ROAD
TEST HOLE 8
DARK BROWN SANDY SILT W. MINOR GRAVEL 6"-12" MOIST
DARK BROWN SANDY SILT W. HEAVY GRAVEL, HARD, MOIST
DARK BROWN CLAYEY SILT W. TRACES OF GRAVEL, VERY STIFF, MOIST
DARK BROWN CLAYEY SILT W. TRACES OF GRAVEL MOIST
DARK BROWN GRAVEL W. SILTY SAND, MOIST, 3/4"-3".
REFUSAL
PENITENCIA
TEST HOLE 7
DARK BROWN SANDY SILT W. GRAVEL, LOOSE 6"-12", DRY
DARK BROWN SANDY SILT STIFF, DRY
BECOMES MOIST
DARK BROWN GRAVEL W. SILTY SAND, DENSE, MOIST, 3/4"-4"
REFUSAL
LEGEND
ESSENTIALLY IMPERMEABLE
CLAY GREEN DIAGONAL LINES INDICATE SILTY CLAY; RED, GRAVEL
SLOWLY PERMEABLE
SILT BLUE DIAGONAL LINES INDICATE CLAYEY SILT; YELLOW, SANDY SILT
MODERATELY TO HIGHLY PERMEABLE
SAND GREEN DIAGONAL LINES INDICATE SILTY SAND;
GRAVEL GREEN DIAGONAL LINES INDICATE SILTY GRAVEL; BLUE, CLAYEY GRAVEL